

**IN THE DRAWINGS:**

Applicant added **Fig. 10**, which is attached to this response.

## REMARKS

Applicants respectfully request consideration of this application. The following arguments are provided to impart precision to the claims, by more particularly pointing out the invention, rather than to avoid prior art.

### Drawings

The drawings have been objected under 37 CFR §1.83(a). Specifically, the drawings have been objected to for failure to show “said carbon-based cladding of said second signal line is continuous with said carbon-based cladding of said first signal line” of claim 3; “said carbon-based cover of one of said plurality of conductor elements connects to another carbon-based cover of another of said plurality of conductor elements,” claim 31; and “said carbon-based cladding of said first signal line is contiguous with said second signal line,” claim 39. Drawing sheets are submitted herewith in response to Examiner’s requirement citing 37 CFR 1.121(d).

Applicants respectfully submit added **Fig. 10** illustrates an embodiment where “said carbon-based cladding of said second signal line is continuous with said carbon-based cladding of said first signal line,” claim 3; “said carbon-based cover of one of said plurality of conductor elements connects to another carbon-based cover of another of said plurality of conductor elements,” claim 31; and “said carbon-based cladding of said first signal line is contiguous with said second signal line,” claim 39. Specifically, **Fig. 10** illustrates an embodiment where each of the signal lines 14, 16, 18 include an elongated conductor element 20 that is surrounded by a carbon-based cladding 22 (indicated by shading in the figures). The carbon-based cladding 22 is

not removed between adjacent signals; therefore, the carbon-based cladding 22 of signal line 14 is continuous with the carbon-based cladding 22 of signal line 16 and the carbon-based cladding 22 of signal line 16 is continuous with the carbon-based cladding 22 of signal 18. Therefore, **Fig. 10** illustrates an embodiment of a carbon-based cladding of a signal line is continuous/contiguous/connects with a carbon-based cladding of another signal line.

### 35 U.S.C. § 112 Rejections

Claims 3, 31, and 37 have been rejected under 35 U.S.C. §112, second paragraph, for being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

Applicants respectfully disagrees with the rejection because the definiteness of claim language must be analyzed in light of the teachings of the prior art and the specification as it would be interpreted by one of skill in the art and the specification as it would be interpreted by one of skill in the art [MPEP 2173.02]. Applicant respectfully submits one of ordinary skill in the art of implementing transmission structures on printed circuit boards would understand the claims from the specification and the figures.

**Figs. 7 and 10** illustrate embodiments (structure) where “said carbon-based cladding of said second signal line is continuous with said carbon-based cladding of said first signal line,” claim 3; “said carbon-based cover of one of said plurality of conductor elements connects to another carbon-based cover of another of said plurality of conductor elements,” claim 31; and “said carbon-based cladding of said

first signal line is contiguous with said second signal line,” claim 39.

Furthermore the specification discloses:

“In an alternative embodiment, the carbon-based cladding material is not removed from the regions 34 between adjacent signal lines, such as an embodiment illustrated in **Fig. 10**. By leaving the inter-signal cladding in tact, a lower impedance is achieved between the signal lines.” (Application, pg. 6, ll. 1-3).

Because one of ordinary skill in the art of implementing transmission structures on printed circuit boards would understand the claims from the specification and the figures, the claims particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

Applicant amended claim 36 to read, “a carbon-based cladding having a carbon concentration greater than 60% by weight.” Because a carbon concentration of approximately 99% by weight, as required in claim 37, is a carbon concentration greater than 60% by weight there is no contradiction.

#### 35 U.S.C. § 102 Rejections

Claims 1, 2, 4, 5, and 8 have been rejected under 35 U.S.C. §102(e) as being anticipated by Sandhu, U.S. Patent No. 6,084,302 (“Sandhu”).

Claims 30-31 and 33-35 have been rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 4,616,102 to Noorily (“Noorily”).

### *Claim 1*

Applicants respectfully disagree that Sandhu anticipates claim 1 as amended because Sandhu does not include each and every element of claim 1 as amended.

Claim 1 as amended requires a printed circuit board including a carbon-based cladding having a carbon concentration greater than 60 percent by weight over a portion of a conductive member. Specifically, claim 1 requires “a first signal line supported on said dielectric board member.” The first signal line “including an elongated electrically conductive member that is enshrouded with a carbon-based cladding having a carbon concentration greater than 60 percent by weight over at least a portion of the elongated conductive member.”

Sandhu discloses a method for fabricating an integrated circuit interconnect upon a semiconductor substrate to prevent copper diffusion. In this method a copper interconnect is formed. Next, a **metal** is embedded or inserted into the copper interconnect to provide an **introduced metal**, such as titanium, tantalum, tungsten, chromium, and aluminum. A gas is reacted with the **introduced metal** to form a barrier layer cladding upon the copper interconnect. Substantially all of the **introduced metal** diffuses to the surface of the copper interconnect and reacts with the gas. Once the **introduced metal** reacts with the gas, the resistivity of the interconnect is substantially equal to that of copper. As discussed in Applicants specification, carbon-based materials would have a resistivity (1 over conductivity) somewhere between a metal and a dielectric. (See Application, pg. 7, ll. 11-13). Thus, the carbide cladding consisting of metal and carbon is a cladding having a lower concentration of carbon relative to the metal (metal-based cladding).

Because Sandhu does not disclose printed circuit board having a first signal line "including an elongated electrically conductive member that is enshrouded with a carbon-based cladding having a carbon concentration greater than 60 percent by weight over at least a portion of the elongated conductive member," Sandhu fails to anticipate claim 1.

#### *Claims 2-8*

Applicants respectfully submit that claims 2-8 depend on independent claim 1 and include all the limitations of claim 1. As such, claims 2-8 are patentable for at least the same reasons as claim 1.

#### *Claim 30*

Applicant respectfully disagrees with the rejection because Noorily does not describe each and every element of the invention of claim 30. For example, claim 30 requires a carbon-based cover having a carbon concentration higher than 60 percent by weight and one of said plurality of conductor elements fully covered over top, bottom, and side portions thereof with said carbon-based cover. Conversely, Noorily describes an electric cable assembly for use with undercarpet wiring systems with electric conductors contained within a casing made from a laminate of polyester and polyvinylchloride. (Noorily, col. 3, ll. 20-25). Noorily fails to describe a carbon-based cover having a carbon concentration higher than 60 percent by weight as required by claim 30; therefore, Noorily fails to anticipate claim 30.

### *Claims 31-35*

Applicants respectfully submit that claims 31-35 depend on independent claim 30 and include all the limitations of claim 30. As such, claims 31-35 are patentable for at least the same reasons as claim 30.

### 35 U.S.C. § 103 Rejections

Claims 6-7, 36-38, and 40-41 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Sandhu in view of EP Application No. EP 0388545 A1 to Kaneyoshi ("Kaneyoshi").

Claim 32 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Noorily in view of Kaneyoshi.

### *Claim 36*

Applicant respectfully disagrees with the rejection because the combination does not teach each and every element of the invention as required by claim 36 and the combination is improperly motivated.

Claim 36 requires a signal line enshrouded by a carbon-based cladding having a carbon concentration greater than 60% by weight atop a dielectric board member.

As discussed above, Sandhu describes a carbide cladding on semiconductor interconnects to prevent copper diffusion. Once the introduced metal reacts with the gas, the resistivity of the interconnect is substantially equal to that of copper.

Thus, this cladding has a greater concentration of metal than that of carbon (metal-based cladding).

Kaneyoshi describes an electrical harness including insulation clad signal transmission wires and a carbon clad ground wire (earth wire) with a metal covering. The signal transmission wires and the ground wire are spaced apart and are wrapped in an electrically conducting sheet covered with an outer insulation layer.

Neither Sandhu nor Kaneyoshi describe a signal line enshrouded by a carbon-based cladding having a carbon concentration greater than 60% by weight atop a dielectric board member. Therefore, the combination of Sandhu and Kaneyoshi does not describe a signal line enshrouded by a carbon-based cladding having a carbon concentration greater than 60% by weight atop a dielectric board member. Thus, the combination fails to render claim 36 obvious.

Moreover, the combination of Sandhu and Kaneyoshi is improperly motivated because one of ordinary skill in the art of implementing transmission structures on printed circuit boards would not be motivated to combine a reference in the art of semiconductor interconnects with a reference in the art of cable shielding. First, the design considerations are different for cables and semiconductor interconnects. Cables are typically flexible and the dimensions of cables used are typically orders of magnitude greater than that of the semiconductor interconnects, such as those used in Sandhu. For instance, Sandhu discusses electrical interconnects having widths in the order of microns. Conversely, Kaneyoshi discusses dimensions on the order of millimeters. Because of the difference in the dimensions, different techniques are used in fabricating cables than those used in semiconductor



processes. For example, Sandhu discusses implanting ions and using plasma immersion to create structure with thicknesses measured in angstroms.

The problem solved in Sandhu is also completely different from the problem solved by Kaneyoshi. The Sandhu invention provides a method for preventing diffusion of copper atoms from copper metallization. (See Sandhu, col. 2, ll. 14-21). Conversely, Kaneyoshi solves the problem of poor shielding in high frequency cables. An ordinary person skilled in the art solving a problem dealing with atom diffusion would have no motivation to look to the art of cable shielding for a solution.

Because of the differences between the art of cables and that of semiconductor interconnects, one skilled in the art of semiconductor interconnects would not be motivated to combine the reference of Sandhu with that of Kaneyoshi. Since the problems solved in the references are different, one skilled in the art of semiconductor interconnects would not be motivated to employ the cable shielding techniques of Kaneyoshi. Furthermore, neither Sandhu nor Kaneyoshi provide motivation to combine cable technology with that of semiconductor interconnects. Thus, the motivation can only be gleaned from impermissible hindsight.

#### *Claims 37-41*

Applicants respectfully submit that claims 37-41 depend on independent claim 36 and include all the limitations of claim 36. As such, claims 37-41 are patentable for at least the same reasons as claim 36.

## CONCLUSION

Applicants respectfully submit that the rejections have been overcome by the remarks. Accordingly, Applicants respectfully request the objection and the rejection be withdrawn and the claims allowed. If the allowance of these claims could be facilitated by a telephone conference, the Examiner is invited to contact Michael A. Bernadicou at (408) 720-8300.

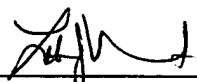
Pursuant to 37 C.F.R. § 1.136(a)(3), applicants hereby request and authorize the U.S. Patent and Trademark Office to (1) treat any concurrent or future reply that requires a petition for extension of time as incorporating a petition for extension of time for the appropriate length of time and (2) charge all required fees, including extension of time fees and fees under 37 C.F.R. §1.16 and §1.17, to Deposit Account No. 02-2666.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP

Dated:

12400 Wilshire Boulevard  
Seventh Floor  
Los Angeles, CA 90025-1030  
(408) 720-8300

  
\_\_\_\_\_  
Lester J. Vincent, Reg. No. 31,460